NOTES ON THE FLORA OF RHODESIAN MANICALAND : I.

(With Plates 41—45.)

By H. B. Gilliland.

It is intended to publish a series of "Notes" on the Flora of Rhodesian Manicaland (*Gilliland*, 1938*a*) supplementing the account of the vegetation already given (*Gilliland*, 1938*c*). Only those species which are not hitherto recorded in the literature as from Manicaland will be noted. The field notes given refer to vegetation types dealt with in the paper referred to above.

Speaking generally, two types of geographical relationship are shown. Relationship with the north and with the south—a general "East African" relationship—which is particularly marked in the flora of the upper or mountain zone; and a relationship with the west—with Angola, round the edge of the Congo Basin, to Nigeria—which is shown chiefly by some species from the lower muPfuti zone.

The upper mountain zone is unique in Rhodesia except for portions of Umtali county and Gazaland (*Swynnerton*, 1911) and occasional records from the Umvukwe Hills (*Gilliland*, 1938*b*).

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BRYOPHYTA.

By W. R. Sherrin and H. B. Gilliland.

Records of the Bryophytes from Rhodesia are scarce, Eyles' (1916) list records some dozen and Sim (1926) notes many localities, but very few have as yet been recorded from Manicaland.

I. HEPATICAE.

(*a*) Marchantiaceae.

1. **Marchantia tabularis** *Nees, Hep. Eur. iv.* 71 ; *Sim, Trans. Roy Soc. S.-A. xv.* (1926) 28.

Mountain zone : Farm lands : Along the wall of an irrigation furrow : Nodzi ; May, 1934, No. 217.

2. **Fimbriaria marginata** *Nees, in Hort. Phys. Berol.* (1820), 44; *Sim, in S.-A. Jour. Sci.* (1922) 297.

   Mountain zone: Gum plantation: In mats facing south-west: Nodzi: May, 1937. No. 215.

(*b*) BLYTTIACEAE.

3. **Symphyogyna Lehmanniana** *Mont. and Nees, Syn. Hep.* 483; *Sim, Trans. Roy. Soc. S.-A.* (1926) 33.

   Mountain zone: Indigenous forest: Forming a very large bed on a bank in deep shade: Mt. Nuza; June 1934, No. 306. Growing at the foot of a *Cyathea* in the shade of the canopy near water; Mt. Nuza; June 1934. No. 361.

(*c*) LOPHOZIACEAE.

4. **Plagiochila crispulo-caudata** *Gottsche, Abh. Nat. Ver. Bremen. vii*, 249. *Sim, l.c.* (1922) 298; *l.c.* (1926) 110.

   Mountain zone; Indigenous forest: Common in festoons hanging round the base of trees and shrubs in deep shade: Mt. Nuza; June, 1934. No. 359.

5. **P. natalensis** *Pears. Christ. Ved. Sels. Gornh.* (1886), 15; *Sim, l.c.* (1926) 109.

   Mountain zone: Indigenous forest: Covering a boulder in the fringing forest of the stream; mixed with but in deeper shade than *Trachypodopsis serrulata*; Nyumkombe Valley; August, 1934. No. 742.

II. MUSCI.

(*a*) SPHAGNACEAE.

6. **Sphagnum angolense** *Warnst. in Bull. Herb. Boiss.* (1901), 1086.

   Mountain zone: Vlei community in grassland: Growing in damp hollows between grass clumps; 5,600 ft. on Mt. Nuza plateau: June, 1934. No. 509.

7. **Sphagnum ericetorum** *Brid. Bryol. Univ.* (1826) *apud Warnst. die Torfm. in Konigl. Bot. Mus. in Berlin im Bot. Centralbl.* (1882) *n.* 3—5 *et in Hedwigia xxix* (1890) 227; *Taf. viii, f.* 28, 29; *Taf. x. fig.* 1, 12.

   Mountain zone: Riverine community: Falling in cascades over a ledge of rock on the banks of the Nyumkombe River, October, 1934. No. 893.

(*b*) POLYTRICHACEAE.

8. **Pogonatum capense** (*Hampe*) *Jaeg. Adumbr. i.* 711; *Dixon in S.-A. Jour. Sci.* (1922), 323; *Sim, l.c.* (1926) 136.

   Mountain forest: Disturbed areas: Growing erect and separately but in large beds on a face of clay; Mt. Nuza; June, 1934. Nos. 247 and 248.

9. **Polytrichum Hohnelii** *C.M. in Flora* (1890), 471 ; *Sim, l.c.* 140 *in notis sub. P. commune.*

Mountain zone : Indigenous forest : Growing on a red clay slope in kloof forest ; Mt. Nuza ; June, 1934.

(*c*) FISSIDENTACEAE.

10. **Fissidens glaucescens** *Horns. in Linnaea* (1841), 154 ; *Sim, l.c.* 201.

Mountain zone : Gum plantation : Growing in mats on a bank facing south-west : Nodzi ; May, 1934. No. 214.

11. **Fissidens submarginatus** *Bruch. in Flora* (1846), 133 ; *Dixon, l.c.* 306 ; *Sim, l.c.* 193.

Mountain zone : Indigenous forest ; On a small face of red clay-loam in fringing forest : Mt. Nuza ; June, 1934.

(*d*) TRICHOSTOMEAE.

12. **Leptodontium squarrosum** (*Hook*) *Par. Ind.* ; *Sim, l.c.* 249.

Mountain zone : Rocks : Covering the south and west faces of a boulder at 6,600 ft. on the ridge of Mt. Nuza ; June, 1934. No. 423.

(*e*) ORTHOTRICHACEAE.

13. **Macromitrium tenue** (*Hk. and Grev.*) *Brid. Bryol. Univ. i.* 740 ; *Sim, l.c.* 280.

Mountain zone : Churu : Growing on the bark of *Rapanea melanophleos* in a black vlei churu at 5,600 ft. on Mt. Nuza plateau ; July, 1934. No. 552.

(*f*) BRYACEAE.

14. **Bryum truncorum** *Bory in Brid. Bryol. Univ. i.* 699 ; *Dixon, l.c.* 321 ; *Sim, l.c.* 337.

Mountain zone : Grassland : Rocks : On a tiny shoulder of granite ; 5,600 ft. on Mt. Nuza plateau ; July, 1934. No. 530.

15. **Bryum capillare** *Linn. Suppl.* (1756) 30 ; *Sim, l.c.* 335.

Mountain zone : Disturbed areas ; Growing on a red clay slope in shade of overhanging bushes in kloof forest ; Mt. Nuza, 5,800 ft. ; June, 1934. No. 353.

16. **Rhodobryum umbraculum** (*Bruch.*) *Par. Ind. ed. ii.* (1906), 202 ; *Sim, l.c.* 339.

Mountain zone : Indigenous forest : Growing in a bed on the floor of kloof forest : Mt. Nuza ; August, 1934. No. 737.

17. **Rhodobryum Commersonii** (*Schwaeg.*) *Par. l.c.* 198 ; *Dixon, l.c.* 321 ; *Sim, l.c.* 340.

Mountain zone : Indigenous forest : In shelter cast by some fallen leaves of *Cyathea* on the floor at the edge of kloof forest : Mt. Nuza ; June, 1934. No. 364.

(*g*) HEDWIGIACEAE.

18. **Hedwigidium imberbe** (*Sm.*) *Steph. Bry. Eur. iii. Mon. p.* 3. *t.*1. ; *Sim, l.c.* 349.

    Mountain zone : Grassland : Rocks : Covering the north and east faces of a boulder at 6,600 ft. on Mt. Nuza ; June, 1934. No. 424.

(*h*) LEUCODONTACEAE.

19. **Leucodon assimilis** (*C.M.*) *Jaeg. Ad. ii.* (1877-78) 124 ; *Sim, l.c.* 358.

    Mountain zone : Indigenous forest : On riverside ledges and boulders in the Nyumkombe Valley forest ; October, 1934. No. 879.

    muPfuti zone : Riverine : Growing on boulders near the Honde Falls ; November 1934. No. 1099.

(*i*) BRACHYTHECIACEAE.

20. **Brachythecium pseudoplumosum** *Brid. Mant. M.*, 170 ; *Sim, l.c.* 371.

    Mountain zone : Gum plantation : Growing in mats on a bank facing south-west : Nodzi ; May, 1934. No. 214.

    Grassland : Rocks : On the west face of a granite outcrop : Farm Charity ; June, 1934. No. 531.

(*j*) NECKERACEAE.

21. **Aerobryopsis capensis** (*C.M.*) *Fleisch. in Hedw.* (1905) ; 305 *Sim, l.c.* 394.

    Mountain zone : Indigenous forest : Hanging in festoons from branches in chiNyamariro forest, but rare ; August, 1934. No. 748.

22. **Pilotrichella chrysoneura** (*Hampe*) *Jaeg. Adumbr. ii.* (1877-78), 100 ; *Sim, l.c.* 397.

    Mountain zone : Indigenous forest : Hanging in festoons from the branches in chiNyamariro forest, common ; August, 1934. No. 749.

23. **Porothamnium natalense** (*C.M.*) *Lindb. in Hedw. xli.* (1902), 209 ; *Sim, l.c.* 403.

    Mountain zone : Indigenous forest : Growing thickly on the bark of trees in the chiNyamiriro forest ; August, 1934. No. 750.

(*k*) ENTODONTACEAE.

24. **Trachyphyllum gastrodes** (*Welw. and Duby*) *Gepp. Dixon, l.c.* 326 ; *Sim, l.c.* 405.

    Mountain zone : Indigenous forest : Growing on riverside ledges and boulders in the Nyumkombe forest ; October, 1934. No. 879.

25. **Entodon Dregeanus** (*Hornsch.*) *C.M. in Linnaea* (1844), 706 ; *Dixon, l.c.* 326 ; *Sim, l.c.* 411.

    Mountain zone : Indigenous forest : Common moss in kloof forest on the south face of Mt. Nuza ; September, 1934. No. 829.

26. **Entodon natalensis** *C.M. in Hedw.* (1899), 133 ; *Sim, l.c.* 410.

    Mountain zone : Churu : Growing all over the slanting stems of a shrubby *Solanum* in a *Solanum-Hypericum* churu : Mt. Nuza plateau ; June, 1934. No. 497.

(*l*) HYPNACEAE.

27. **Ectropothecium regulare** (*Brid.*) *Jaeg. Adumbr. ii.* 531 ; *Dixon, l.c.* 330 ; *Sim, l.c.* 425.

    muTsatsa zone : muTsatsa-muJanje community : Growing under a boulder but getting the afternoon sun ; Odzani valley ; August, 1934. No. 716.

(*m*) SEMATOPHYLLACEAE.

28. **Sematophyllum brachycarpum** (*Hampe*) *Broth. Die. Nat. Pflanzenfam. Musci, ed. ii.* (1924), 431 ; *Sim, l.c.* 435. *Rhapidostegium brachycarpum* (*Hampe*) *Jaeg.* ; *Dixon, l.c.* 331.

    Mountain zone : Disturbed areas : Covering the faces of a boulder above the *Marchantia-Fimbriaria* belt on an irrigation furrow at Nodzi : May, 1934. No. 218.

(*n*) HOOKERIACEAE.

29. **Cyclodictyon vallis-gratiae** (*Hampe*) *Broth. l.c. ed. i.* 395 ; *Sim, l.c.* 443.

    Mountain zone : Indigenous forest : On a rock in a stream bed of running water under full canopy of kloof forest : Mt. Nuza ; June, 1934. No. 362.

(*o*) RHACOPILACEAE.

30. **Rhacopilum capense** *C.M. in Hedw.* (1899), 124 ; *Dixon, l.c.* 328 ; *Sim, l.c.* 447.

    Mountain zone : Indigenous forest : Forming a dense mat growing over a tree in kloof forest : Mt. Nuza ; June, 1934. No. 301.

PTERIDOPHYTA.

By A. H. G. ALSTON and H. B. GILLILAND.

Ferns and their Allies are distributed in Rhodesian Manicaland in a manner closely correlated with the three main vegetation types. Thus the great majority occur in the upper or mountain zone, while the types recorded from the lower muTsatsa and muFuti zones are usually quite distinct species. This is, to a large extent, correlated with temperature and rainfall; the climates of the lower two zones being sub-tropical and tropical respectively, while the climate of the mountain zone—equivalent to the "mist-belt" of the Union of South Africa—is more temperate.

In the collections made from this area not a few species (asterisked in the enumeration) have emerged as new records for Africa south of the Zambesi. Amongst these *Cyathea Deckenii* stands out as the most striking. Photographs (plate 42) illustrate this interesting plant.

Specimens are represented in the herbarium of the Witwatersrand University and in the British Museum Herbarium.

The great majority of the ferns, if given a name at all, are referred to by the Manyika as "*Nyagatsenja*" but there are some few exceptions to this rule; thus bracken is called "*ruGombwe*".

I. FILICALES.

(*a*) HYMENOPHYLLACEAE.

1. ***Hymenophyllum Kuhnii** C. Chr. Ind. Fil. (1905) 363.

Mountain zone: Kloof forest in the Nyumkombe valley: Growing along the horizontal branch of a tree; August, 1934. No. 736.

(*b*) CYATHEACEAE.

2. ***Cyathea Deckenii** Kuhn in v. Deck. Reis. iii. pt. 3 (1859) 57.

Mountain zone: Ziwani Forest: Giant tree fern of 15—30 ft. along the stream bed. Stem, rarely 5 ins. in diameter, covered with spiny leaf bases. Up to 8 ft. high on the stem project prop-roots which buttress the base heavily to a height of 6 ins. March 1935. No. 1750. "*Nyagatsenja.*" Widespread in E. Africa and possibly conspecific with the W. African *C. Manniana Hook.*

(*c*) POLYPODIACEAE.

3. **Dryopteris africana** (Desv.) C. Chr. Ind. Fil. (1905) 251.

Mountain zone: Kloof forest on Mt. Nuza: Rosette fern growing in dense shade: Fronds $1\frac{1}{2}$—3 ft. long; June, 1934. No. 293.

4. **Dryopteris athamantica** (Kze) O. Kuntze, Rev. Gen. Pl. ii. (1891) 812; Sim, Ferns of South Africa, ed. ii. (1915) 107: Burtt Davy, Man. Fl. Plts. Transvaal, i. (1926) 75.

Nephrodium athamanticum (Kze) Hook., Sim, l.c. ed. i. (1892) 183; *Gepp, Jour. Linn. Soc. xl.* (1911) 241: *Eyles, Trans. Roy. Soc. S.-Afr. v.* (1916) 279.

muFuti : Riverine vlei community : Fern growing at 3,500 ft. in the iNyumquarara Valley. February, 1935. " *Nyagatsenja.*"

5. **Dryopteris prolixa** (Willd.) O. Ktze. Rev. Gen. ii. (1891) 813, var. **Bergiana** (Schl.) Alston, comb. nov !

D. Bergiana (Schl.) O. Ktze, Sim, l.c. ed. ii 93 ; *Burtt Davy, l.c.* 79. *Nephrodium Bergianum (Schl.) Baker, Sim, l.c. ed. i.* 175 ; *Eyles, l.c.* 280 and 288. *Polypodium obtusilobum Eyles non Desv. l.c.* 288.

Penhalonga : Bennett and Holland.

muFuti : Fern of a stream bank amongst Narwatsi : Honde Valley. November, 1934. No. 1124.

6. **Didymochlaena truncatula** (Sw.) J. Sm. Jour. Bot. 4 (1841) 196 ; Sim, ed. ii. 112 ; Burtt Davy, l.c. 80.

D. lunulata Desv. Sim, l.c. ed. i. 164 ; *Gepp, l.c.* 240 ; *Eyles, l.c.* 286. *D. sinuosa Desv, Eyles, l.c. in syn.*

Mountain zone : Ziwani forest : Stout fern with fronds of 3—6 ft. Stem short and stout. March, 1935. No. 1747.

7. ***Nephrolepis undulata** (Afz.) J. Sm. in Bot. Mag. lxxii Comp. (1846) 35.

muFuti : Riverine community : Stream bed fern at 3,500 ft. in the iNyumquarara Valley. February, 1935. No. 1644. " *Nyagatsenja.*"

Commonly referred to *N. cordifolia (L.) Presl.*, which has scaly rachises and more coriaceous pinnules.

8. ***Asplenium hypomelas** Kuhn Fil. Afr. (1868) 104.

Mountain zone : Kloof forest of the Nyumkombe valley : common epiphyte : September, 1934. No. 759. Rosette fern growing in dense shade ; fronds 4—6½ ft. long. Mt. Nuza kloof forest. June, 1934. No. 294.

9. ***Asplenium linearilobum** Peter in Fedde Rep. Beih. xl. (1929) 80, t 2, f. 7—8.

Mountain zone : Kloof forest of the Nyumkombe Valley : an epiphyte. September, 1934. No. 754.

10. **Asplenium Mannii** Hook. Second. Cent. Ferns, (1861) t. 60 ; Gepp, l.c. 240 ; Eyles, l.c. 283 ; Sim, l.c. ed. ii. 174.

Mountain zone : Kloof forest in Nyumkombe Valley : Common epiphyte. September, 1934. No. 751.

11. **Asplenium aethiopicum** (Burm) Becherer in Candollea vi. (1935) 23.

A. praemorsum Sw. Prodr. (1788) 130 ; *Sim, l.c. ed. ii.* 163. *A. furcatum Thunb. Sim, l.c. ed. i.* 282 ; *Gepp, l.c.* 239 ; *Eyles, l.c.* 282. *A. adiantoides Eyles non C. Chr. l.c.* 282 *in syn.*

Mountain zone : Hypericum churu in grassland : In crevices of a boulder at 5,600 ft. on Mt. Nuza. Fronds 6—15 ins. long. June, 1934. No. 529.

12. **Asplenium Sandersoni** Hook. Sp. Fil. 3 (1860) 147 t. 179 ; Sim, ed. i. 132 ; ed. ii. 139 ; Eyles, l.c. 283 ; Burtt Davy, l.c. 83.

Mountain zone : Kloof forest in the Nyumkombe Valley ; common epiphyte. September, 1934. No. 752.

13. **Blechnum capense** (Linn.) Schl. Adumbr. (1825) 34, t 18 ; Sim, l.c. ed. ii. 186 ; Burtt Davy, l.c. 85.

Lomaria procera Spreng. Sim, l.c. ed. i. 122 ; *Gepp, l.c.* 239 ; *Eyles, l.c.* 281.

Mountain zone : Vlei edge community : On the stem of a *Cyathea* : fronds 6—18 ins. Mt. Nuza plateau. July, 1934. No. 498.

14. **Blechnum tabulare** (Thunb.) Kuhn, Fil. Afr. (1868) 94 ; Sim, l.c. ed. ii. 188 ; Burtt Davy l.c. 85.

Lomaria Boryana Willd. Gepp. l.c. 239 ; *Eyles, l.c.* 281.

Mountain zone : Kloof forest on Mt. Nuza : semi arboreal fern with stem 2 ft. high and 2 ft. in circumference. Individual fronds 3½-4½ ft. Under canopy. June, 1934. No. 266.

15. **Pellaea calomelanos** Link. Fil. Sp. (1841) 61 ; Sim, ed. i. 104 ; Gepp. l.c. 238 ; Eyles, l.c. 284, p.p.

P. hastata (*Thunb.*) *Link. Fil. Spec.* (1841) 60.

muTsatsa : Xerosere : Growing on a granite koppie beside the Inyanga road ; Oct., 1934. No. 1023.

16. **Pellaea Doniana** (J. Sm.) Hook. Sp. Fil. ii. (1858) 137 ; Sim, Trans. S.-Afr. Phil. Soc. xvi. (1907) 279 ; Ferns of S.-Afr. ed. ii. 211 ; S.-Afr. Jour. Sci. (1923) 311 ; Eyles, l.c. 284.

Mountain zone : Kloof forest at 4,500 ft. in Nyumkombe valley ; Feb., 1935. No. 1570.

17. **Pellaea viridis** (Forsk.) Prantl. in Engl. Jahrb. iii. (1882) 420 ; Sim, l.c. ed. ii 227 ; Burtt Davy, l.c. 86.

P. hastata Link. non Prantl. ; Sim, l.c. ed. i. 101 *; Gepp, l.c.* 238 *; Eyles, l.c.* 285.

muFuti : Riverine rocks : At 3,500 ft. in the iNyumquarara valley ; Feb., 1934. No. 1677.

18. **Notholaena Buchanani** Baker, Syn. Fil. (1868) 373 ; Sim, ed. ii. 222 ; Burtt Davy, l.c. 88.

Notochlaena Eyles, l.c. 285.

muFuti : Xerosere : Growing in crevices of a rock mass at 3,000 ft. in the iNyumquarara valley ; Feb., 1935. No. 1568.

19. **Cheilanthes multifida** Swartz, Syn. 129 (1806) 334 ; Sim, ed. i. 87 ; ed. ii. 228 ; Eyles, l.c. 285 ; Burtt Davy, l.c. 88.

Mountain zone : Grassland : Growing in the shelter of the north and west faces of a boulder at 6,200 ft. on Mt. Nuza ; June, 1934. No. 399.

20. **Adiantum cuneatum** Langsd. et Fisch. Ic. Fil. (1810) 23 t. 26.

muTsatsa : Riverine on farm : On a steep stream bank ; Nodzi ; Sept., 1934. No. 802.

21. **Vittaria isoetifolia** Bory, Voyage, ii. (1804) 325 ; Gepp, l.c. 242 ; Eyles, l.c. 284 ; Sim, l.c. ed. ii. 267.

V. lineata of Sim, l.c. ed. i. 216 *; Eyles, l.c. in syn.*

Mountain zone : chiNyamariro forest : On a tree trunk ; March, 1935. No. 1628.

22. **Loxogramme lanceolata** (Sw.) Presl. Tent. (1836) 215, t. 968.

Polypodium loxogramme Mett. Sim, l.c. ed. ii. 281 ; *Burtt Davy, l.c.* 91. *Gymnogramme lanceolata Hook ; Sim, l.c. ed. i.* 215 *; Gepp, l.c.* 242 *; Eyles, l.c.* 284.

Mountain zone : Kloof forest in the Nyumkombe valley ; common epiphyte ; Aug., 1934. No. 759.

23. **Elaphoglossum Aubertii** (Desv.) Moore, Index. Fil. (1857) 5 ; Sim, l.c. ed. ii. 289.

Mountain zone : Kloof forest in the Nyumkombe valley : In bunches on the banks of the stream ; Aug., 1934. No. 739.

24. ***Elaphoglossum isabelense** Brause in Engl. Jahrb. liii. (1915) 431.

Mountain zone : Kloof forest in the Nyumkombe valley : Fern with deep green leaves growing on the river banks in heavy shade ; Sept., 1934. No. 890.

(*d*) GLEICHENIACEAE.

25. **Gleichenia polypodioides** (Linn.) Smith, Mem. Ac. Turin. 5 (1793) 419 ; Sim, l.c. ed. i. 43, ed. ii. 297 ; Gepp, l.c. 237 ; Eyles, l.c. 289 ; Burtt Davy, l.c. 92.

Mountain zone : Kloof forest of the Nyumkombe valley : Quite common ; Aug., 1934. No. 907.

26. **Gleichenia umbraculifera** (Kze.) Moore, Ind. Fil. (1862) 384 ; Sim, l.c. ed. i. 44 ; ed. ii. 298 ; Gepp, l.c. 237 ; Eyles, l.c. 289 ; Burtt Davy, l.c. 92.

Mountain zone : Kloof forest on Mt. Nuza : Much branched fern in a grove in deep shade ; June, 1934. No. 305.

(*e*) SCHIZEACEAE.

27. **Aneimia Schimperiana** Presl. Suppl. (1845) 84. sens. lat.

A. anthriscifolia of Sim, Trans. S.-Afr. Phil. Soc. xvi. (1907)

294 ; *Eyles, l.c.* 289 ; *Sim, l.c. ed. ii.* 308 ; *Burtt Davy, l.c.* 93 *non Schrad.*

muFuti : In muFuti : On a rocky streambank in the iNyumquarara valley ; Feb., 1935. No. 1646. "*Nyagatsenja.*"

A. anthriscifolia Schrad. is confined to S. America.

II. LYCOPODIALES.

(*a*) LYCOPODIACEAE.

28. **Lycopodium clavatum** Linn. var **inflexum** (Beauv.) Spring. in Mem. Ac. Sci. Brux. xv. (1842) 90 ; Gepp, l.c. 244 ; Eyles, l.c. 291 ; Burtt Davy, l.c. 96.

L. clavatum Sim non Linn. l.c. ed. i. 245 ; *ed. ii.* 329.

Mountain zone : Kloof forest on Mt. Nuza : Forming a dense mat twining over the ground amongst the stems of other plants in the shade over the bed of a stream. Frequently fasciated ; June, 1934. No. 279.

29. **Lycopodium sarcocaulon** A. Br. ; Welw. ex Kuhn Fil. Afr. (1868) 210.

L. carolinianum var. grandifolium Spring. in Mem. Ac. Sci. Brux. xxiv. (1850) 46 ; *Burtt Davy, l.c.* 96. *L. carolinianum Sim non Linn. l.c. ed. i.* 246 ; *ed. ii.* 330 ; *Eyles, l.c.* 291.

Mountain zone : Vleis : Creeping plant, dorsiventral and dichotomising : Growing over black vlei mud : Mt. Nuza plateau ; July, 1934. No. 506. One of the commonest vlei plants on Mr. Nuza plateau ; Aug., 1934. No. 1262.

30. ***Lycopodium ophioglossoides** Lam. Encycl. iii. (1791) 646.

Mountain zone : Kloof forest of the Nyumkombe valley : Scrambling ephiphyte in deep shade of the fringing forest ; Oct., 1934. No. 875.

Also from the Transvaal : Mist belt forest : Woodbush : A. H. Bunting in Herb. Wits. Univ. No. 20502 : A. E. Grewcock in Herb. Wits. Univ. No. 20503.

31. **Lycopodium verticillatum** Linn. f. Suppl. Syst. Veg. ed. xiii. (1781) 448 ; Sim, l.c. ed. i. 243 ; ed. ii. 325 ; Gepp, l.c. 243 ; Eyles, l.c. 291 ; Burtt Davy, l.c. 96.

Mountain zone : Kloof forest of the Nyumkombe valley : Scrambling epiphyte ; Oct., 1934. No. 874.

(*b*) SELAGINELLACEAE.

32. ***Selaginella abyssinica** Spring. in Mem. Ac. Sci. Brux. xxiv. (1850) 99.

Mountain zone : Kloof forest of Mt. Nuza : In fairly dense shade near a stream ; June, 1934. No. 290.

33. **Selaginella Kraussiana** A. Braun, Ind. Sem. Hort. Berol. (1859) 22 ; Sim, l.c. ed. i. 252 ; ed. ii. 335 ; Gepp, l.c. 244 ; Eyles, l.c. 291 ; Burtt Davy, l.c. 97.

Mountain zone : Kloof forest on Mt. Nuza : In the shade of ferns on a streambank, creeping ; June, 1934. No. 216.

III. EQUISETALES.

(*a*) EQUISETACEAE.

34. **Equisetum ramossissimum** Desf. Flor. Atlant. 2 (1800) 398 ; Sim, ed. i. 240 ; ed. ii. 334 ; Eyles, l.c. 290 ; Burtt Davy, l.c. 95.

muFuti : Riverine vegetation among Narwatsi : Growing on a streambank in the Honde valley ; Nov. 1934.

GYMNOSPERMS

By H. B. GILLILAND.

Gymnosperms in Southern Rhodesia, though present and of good quality, are economically unimportant as yet, since they occur in such small quantity. They are confined to Manicaland, Umtali county and Gazaland on the eastern border. Little sylvicultural research has as yet been prosecuted into their potentialities and naturally so since the investigations proceeding are concerned with the economically important " mahoganies " and " teaks " of the western parts of the country. Their geographical limitation to the eastern border zone of high rainfall and humidity is interesting and suggests a relict—as does their ecological behaviour—from past greater prominence and wider distribution. A record from the Umvukwe hills would go far to substantiate this suggestion. The interesting record, made by Dr. Galpin, of the occurrence of Podocarpus to the south-west in the mountains west of Nylstroom has been commented upon elsewhere. (Gilliland 1938*b*.)

Three genera, with one species each, are represented.

CYCADACEAE.

Encephalartos gratus Prain, var. **manikensis** Gilliland, var. nov.

A typo, foliolis brevioribus, strobile maris fere sessile, tomento floccoso absente, facillime distinguenda.

Plant from 3—8 ft. tall with, in the female a short stem of 4—10 in. height and 1 ft. diameter, in the male a stem of 3—4 ft. and 1 ft. diameter, both covered with remnants of leaf bases and scales. Leaves, pinnate, with ± 60 pairs of pinnae, narrowly ovate-lanceolate in outline, 3—4 ft.

long. Petiole and rachis sub-cylindric, glabrous in specimens seen. Pinnae, lower, much reduced, lanceolate to triangular-acute, $\frac{3}{4} \times \frac{1}{2}$ in. with 1—2 sharp diverging spines above and below and a spiny tip; middle, 5—6 ins. × $\frac{3}{4}$—1 in., lanceolate-ovate, sub-arcuate, ending in a forwardly directed spine and with one or two diverging spines on the upper and lower side; upper, narrow lanceolate-arcuate, entire or frequently with one or two diverging spines on the upper or lower edge, sharp pointed. Male cone, on a short peduncle, 1—$1\frac{1}{2}$ ins., and glabrous, 9 ins.—1 ft. tall by 3—4 ins. broad at the base, tapering to a rounded apex. Scales numerous, spirally arranged, with a flattened, rhomboid, slightly recurved tip, ridged, but not umbonate. Female cone not seen. Seeds, without the fleshy coats, 1—$1\frac{1}{2}$ ins. by $\frac{1}{2}$—$\frac{3}{4}$ in., ovoid.

Seedling leaves much shorter, with more oblong, smaller leaflets and many spiny teeth forming a multi-spinose, blunt tip. Gilliland, No. 2016. In muJanje in the Numkwarara valley in muTsatsa zone. Dominant in the xerosere on Gorongowe at 4,500 ft. Plant of 1—4 ft. July, 1937. muTete of chiManyika. (Plates 43 and 44.)

Prain in Flora of Tropical Africa, VI, ii. (1917) 346, Stapf & Burtt Davy in the Manual of Flowering Plants and Ferns of the Transvaal, i. (1926) 98 and Hutchinson and Rattray in Flora Capensis, V., ii. (1933) 28, have given accounts of the Cycads of the areas surrounding Manicaland. From these it is apparent that our plant belongs to that closely related group containing *E. Hildebrandtii*, *E. gratus*, *E. Woodii*, *E. Altensteinii* and *E. transvenosus*. Considering the close relationship of these species and the frequent difficulties they present we thought it best to give our plant varietal rather than specific rank till more is known about them.

Rumours of a Cycad on the eastern border of Rhodesia reached my ears early in 1934 and, a year later, while in the Numkwarara valley superintending locust destruction, I became convinced of the existence of a Cycad on the slopes of Mt. Gorongowe from the description of the "muTete" given by my boys. Unable at that time to investigate further I nevertheless decided when opportunity offered, to make a further search. So that in July, 1937, when traversing the valley with the Witwatersrand University Botanical Expedition, I detailed two students, Messrs. H. Janse van Rensburg and I. L. Johnston, to cross the river and climb the slopes of the mountain. They rejoined us at nightfall with some leaves, male cones, young plants and seeds as well as with some excellent photographs of an *Encephalartos*.

On the lower slope of the mountain the plant grows in *Uapaca* and *Brachystegia* woodland, while higher up it becomes the dominant on the rocky mountain slopes. It fruits, according to the natives, in the rains (December—January). At any rate all that my young friends could find by diligent search round the base of female plants were some old seeds from which all trace of succulent coats had been removed. The males appear to be more numerous than the females and seedlings are scattered.

Swynnerton in his account of Gazaland makes no mention of a Cycad and my own observations in that region disclosed no sign of specimens. Perhaps some may eventually be found on the Chimanimani mountains or on the eastern slopes of Mt. Inyangani. The plant is the same, I think, as the specimen I collected in 1935 on the rocks at the edge of the forest on the summit of Mt. Garuso in Portuguese East Africa, which is, in all probability, that referred to by Sim. (1909).

TAXACEAE.

Podocarpus milanjianus Rendle in Trans. Linn. Soc. ser. II., iv. (1894) 61 ; Jour. Linn. Soc. Bot. xl. (1911) 235 ; Eyles, Trans. Roy. Soc. S.-Afr. v. (1916) 292 ; Stapf, Flor. Trop. Afr. vi. 2 (1917) 340 ; Dallimore and Jackson " Handbook of the Coniferae " ed. ii. (1931) 50 ; " Conifers in Cultivation " Roy. Hort. Soc. (1932) 281.

This Central African " Yellow wood " has a wide distribution, from Kenya in the north to the Chimanimani mountains in Gazaland. It is perhaps at its best in the Usambara Mts. and on Mt. Kenia, where it reaches a height of 100 ft. Although in the Chimanimani reaching a height of 40 ft. with 2 ft. diameter, in Manicaland no such specimens occur. It was observed, in fact, only in one locality on the south east corner of Stapleford Forest Reserve in the valley of the Nyumkombe. Here as a small fruiting tree it reaches a height of 25—30 ft. with an 8 in. trunk and occurs as a sapling of scarcely 2 in. diameter. On the southern slope of the valley in the chiNyamariro forest patch one specimen reaches 60 ft. in height with an 8 in. trunk. (Plate 45, fig. 1.) All specimens noted, except the fruiting tree, were in dense shade under canopy.

Gardner in " Conifers in Cultivation " p. 283 notes that the fruit is " a fleshy aril-like body, bright red when ripe, on the top of which grow two smaller green, soft coated seeds." In my specimens both the " aril " and seeds were a dark blue-purple and covered with a glaucous bloom.

A tree confined, in Manicaland, to the mountain forest zone.

CUPRESSACEAE.

Widdringtonia Whytei Rendle, l.c. t. 9, f. 6-11 ; Jour. Linn. Soc. xl. (1911) 235 ; Sim, For. Flor. Port. East Afr. (1909) 109 ; Eyles, l.c. 292 in syn. ; Stapf, Flor. Trop. Afr. vi. ii. (1917) 334 ; Flor. Cap. v. ii. (1933)

17 ; Burtt Davy, Man. Fl. Plts. & Ferns. Transvaal, i. (1928) 102 ; Dallimore and Jackson, l.c. 541.

W. Mahoni Masters. Jour. Linn. Soc., xxxvii. (1905) 271 ; Sim, l.c. 109.

Callitris Mahoni (Mast.) Engl. Pflanzenwelt Afr. ii. 88.

C. Whytei (Rendle) Engl. l.c. 89 ; Eyles, l.c. 292.

(Plate 45, figs. 2 and 3.)

The general opinion of the Milanje Cedar is that it is one of the most useful of all coniferous timbers. The requisite sylvicultural technique for its exploitation in Rhodesia has, however, proved elusive for although Mr. Swynnerton met with some success in the early days of the century, it has not proved very successful at Stapleford. The tree is at its best in nature on Mt. Milanje where it reaches a height of 120 ft. with a good straight bole but it seems to become dwarfed in more southerly latitudes. The best grown specimen noted in Manicaland was scarcely 50 ft. tall and in the Northern Transvaal it rarely exceeds 8 ft. though fruiting profusely. With the exception of some few isolated specimens noted in a kloof near Melsetter in *Brachystegia* woodland all these are, like the last, plants of the mountain forest zone.

The tree thrives in the milder parts of Great Britain being thus recorded from Cornwall and Rosshire.

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EYLES, F. 1916. A Record of Plants collected in Southern Rhodesia. Trans. Roy. Soc. S. Africa, V. p. 273.

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HENKEL, J. S. 1931. Types of Vegetation in Southern Rhodesia. p.1.

SIM, T. R. 1909. The Forest Flora of Portuguese East Africa. p. 109.

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SWYNNERTON, C. F. M. 1911. A Contribution to our Knowledge of the Flora of Gazaland. Journ. Linn. Soc. Bot. XL. p. 275.

PLATE 41. Tree trunks and branches in the chiNyamariro Forest, Rhodesian Manicaland, showing typical Bryophyte habitat of the mountain zone of that area.

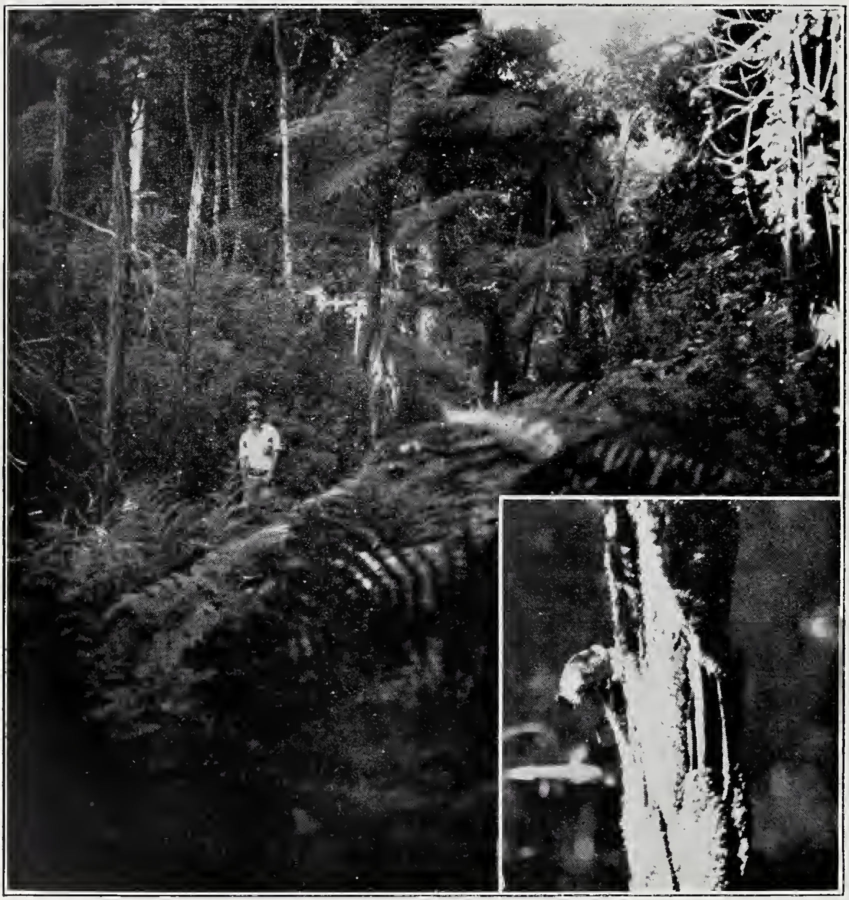


PLATE 42. a. *Cyathea Deckenii*, Kuhn. Growing along the streambed in Ziwani Forest, Imbesa Estate; Penhalonga. The late Mr. H. Kleinschmidt, Forest Officer to the British South Africa Company, in the foreground.

b. (Inset, right). Part of the stem of a specimen at a height of 5 ft., showing the emergence of a prop-root.

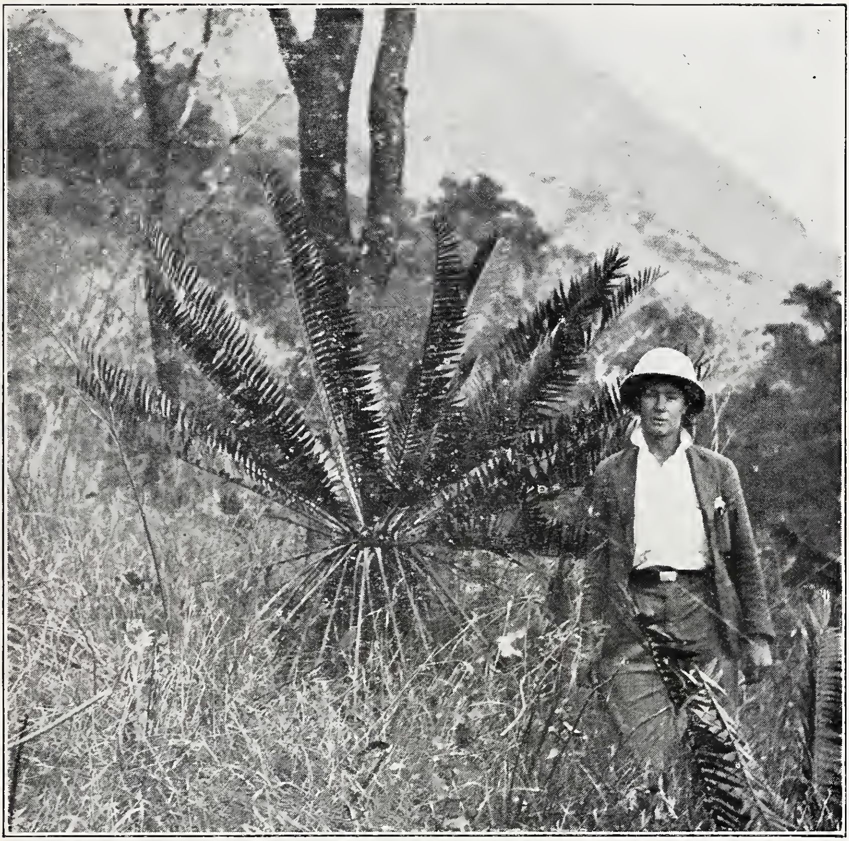
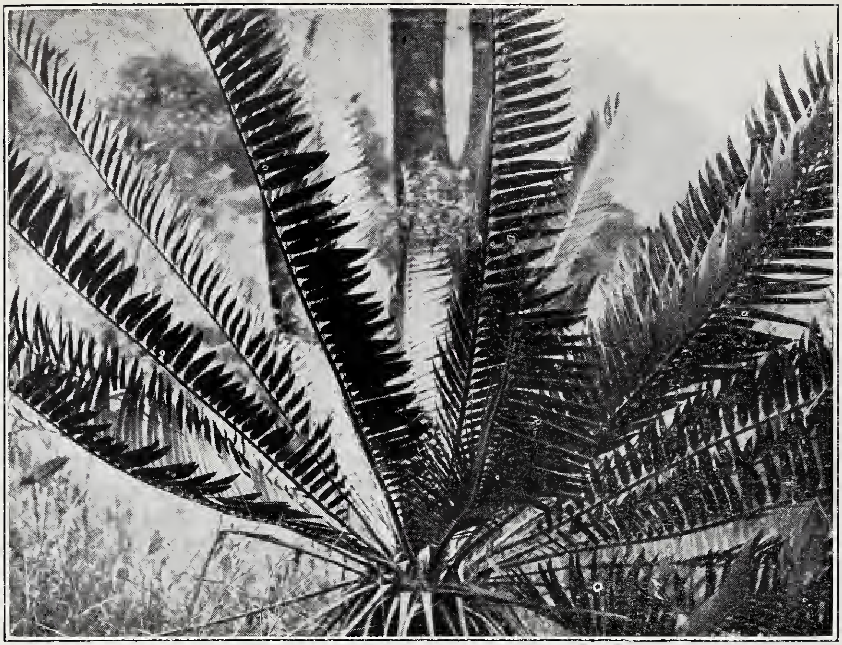


PLATE 43. *Encephalarctos gratus* Prain. var. *manikensis* Gilliland, in Uapaca savannah on the slopes of Mt. Gorongowe, S. Rhodesia.



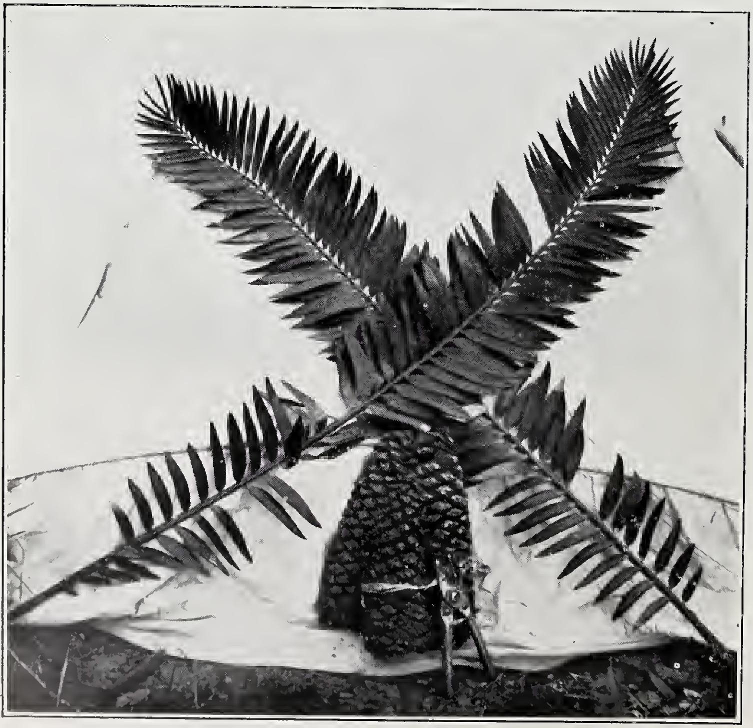
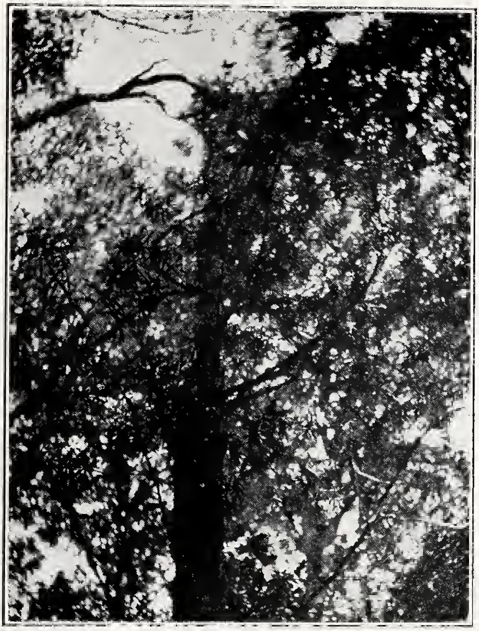


PLATE 44. FIG. 1. *E. gratus* var. *manikensis* showing male cone in amongst terminal rosette of leaves.
FIG. 2. *E. gratus* var. *manikensis*. Leaves and male cones.



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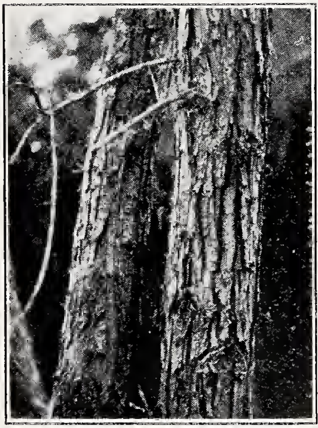

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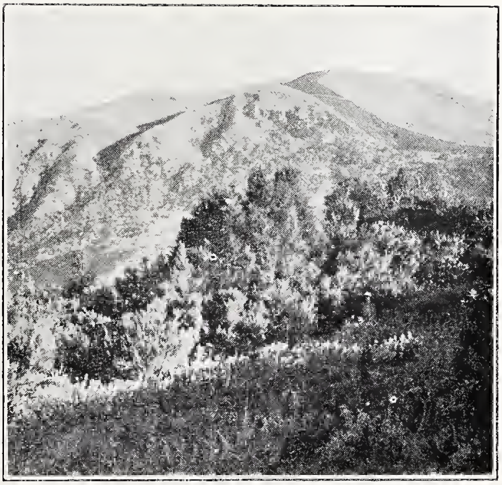

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PLATE 45. FIG. 1. *Podocarpus milanjianus* in chiNyamariro forest, S. Rhodesia.
FIG. 2. Bark of *Widdringtonia Whytei.*
FIG. 3. Clump of *Widdringtonia Whytei* north east of Mt. Nuza, S. Rhodesia.